

Q. How is this different from incineration?

- A. The Glass Furnace Technology is different from incineration in several significant ways. The first difference is that incineration is the combustion of waste to reduce its volume; however, river sediment *does not burn*. The quantities of organics contained in sediment pose environmental concerns, but from a fuel-value perspective they are insignificant.

Incineration of waste leaves large amounts of ash that require landfilling; in comparison, the Glass Furnace technology does not. Attempts have been made to process river sediment in incinerators. Because the sediment does not burn, the incinerators required large quantities of auxiliary fuel and did not provide any reduction in landfilling. As a result, attempting to incinerate sediment has been very expensive and not cost effective.

Q. How is this process different from other vitrification processes already tested?

- A. The main difference with the Glass Furnace Technology is that it is designed specifically for melting materials that have no fuel value. This system uses the same type of system that has been used to melt minerals into glass for many years, except dredged sediment has been substituted for the sand and limestone ingredients that would be the feedstock for clear glass.

There are other vitrification systems currently in existence. Minergy has two others that have been built and operational on large commercial scale applications. Those systems are designed to vitrify materials that have significant fuel value and would normally not be applicable to dredged sediment.

Vitrification systems designed by other companies typically use electric arc technologies. These systems can have very high electric consumption. In contrast, a Glass Furnace is an established technology used for decades in hundreds of commercial applications, with highly energy efficient operations.

Q. What happens to the PCB's, mercury, lead, etc?

- A. A glass furnace system would be capable of destroying or removing all of the sediment's contaminants. Glass furnaces typically operate at 2900 degrees Fahrenheit. At this temperature, all organics (including PCB's) are destroyed. Low vapor point metals such as mercury and lead evaporate and would be caught in downstream air quality control equipment such as a scrubber and carbon filter. Because the glass furnace is very efficient and has extremely low quantities of exhaust gas, it is relatively economic to install an extensive state-of-the-art control systems to capture these metals. The remaining metals contained in the sediment are captured in the glass, and are permanently stabilized in its ceramic matrix.

Q. What evaluation is being done?

- A. The Environmental Protection Agency is performing a complete, independent study of the technology. Every input, output, and multiple mid-process points are being monitored. Samples will be taken over a seven-day test, with sampling performed 20 hours per day. The purpose of the test is to determine the destruction and removal efficiency, the fate of other contaminants, and the potential synthesis of new contaminants in the process.

Q. Are dioxins/furans produced in the process?

- A. Dioxins/furans are not expected to be produced in the Glass Furnace technology. To prove it, the EPA is testing for it as part of their work.

It's important to understand that the creation of dioxins/furans has been attributed to a small number of old vintage garbage-burning incinerators. These facilities have a chlorine-rich exhaust streams with short residence times; also, their air quality control equipment use metal parts that catalyze the formation of chlorinated organics. The Glass Furnace system contains *none* of these characteristics, and therefore does not have the conditions necessary for de-novo synthesis. Nevertheless, a commercial scale glass furnace system would utilize a carbon filtration system as part of its exhaust treatment, that would capture these materials.

Q. What can you do with the Glass Aggregate?

- A. The Glass Aggregate is an inert product that is sold to construction companies. Because the sediment has been melted to a stable glass, and then quenched quickly in a water bath, it is non-crystalline and amorphous. This means the glass is inert, non-leachable, and has features that construction companies like.

Minergy makes a similar glass aggregate at its sludge vitrification plant in Neenah, Wis. That material is so inert that the Wisconsin Department of Natural Resources has exempted it from all regulation and allowed it to be marketed as a product. We have successfully sold all of our glass aggregate to local construction companies. A commercial Glass Furnace system located in Wisconsin could have its product co-marketed along with Minergy's material from the Neenah plant. Our customer markets there include use as ceramic floor tiles, air blast abrasives, concrete construction, and warehouse/parking lot backfill. The Glass Aggregate produced from river sediment is expected to be black in color, which is a distinct advantage for marketing to roofing shingle companies.

Q. What is the expected cost of a commercial operation?

- A. Minergy's studies have indicated that the cost of processing river sediment could be in the \$40-\$80 per ton range. The final economics are driven by the size of the plant, how many months per year it operates, and what the final market for glass aggregate is. These economics are very favorable in comparison to the disposal costs for the Deposit N project, where in and out-of-state disposal costs were \$80 and \$140 per ton, respectively.

The low cost of operation of a Glass Furnace system is attributable to its low energy consumption, significant economy of scale, low exhaust gas volumes, and use of a well established and well understood technology.